Mandatory Reporting of Greenhouse Gas Emissions for Refineries and Hydrogen Plants

California Global Warming Solutions Act of 2006 (AB 32)

December 3, 2008

Sacramento, California

California Air Resources Board

Participation Information

- Workshop Materials and Guidance:
  http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm
- Regulation and Final Statement of Reasons:
  http://www.arb.ca.gov/regact/2007/GHG2007/GHG2007.htm
- Webinar Information for Refineries:
  https://www2.gotomeeting.com/register/179383358
  Phone Dial-In: 888-677-4199 Access Code: 49578

Agenda

- Mandatory Reporting Implementation
- Review of General Requirements
- Reporting for Refineries and Hydrogen Plants
  - Stationary Combustion
  - Process Emissions
  - Fugitive Emissions
  - Flares and Control Devices
- Reporting for Hydrogen Production Facilities

Mandatory Reporting Rulemaking Process

- Regulation approved by Board December 2007
- Modifications released for comment
- Final Statement of Reasons (FSOR) completed October 2008
- OAL approval December 2, 2008

Coordination with Future Regulations

- ARB Scoping Plan
- WCI Regional Reporting
- U.S. EPA Mandatory Reporting

ARB Instructional Guidance for Reporting

- Instructional guidance document available at

  http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm

- Provides explanatory detail and examples, suggested best practices

- Not a substitute for the regulation

ARB's GHG Reporting Tool

- ARB providing web-based platform for GHG reporting
  - Available January 2009
- Reporting tool demonstration workshop
  - December 19, 2008, 9:30 – 12:30

Review of General Reporting Requirements

Who's Responsible for Reporting?

- At facilities, the entity with operational control
- Facility includes reportable sources within contiguous boundaries under common control
- Operational control = introduces and implements environmental, health, safety and operating procedures within the facility

Exempt from Reporting

- Primary and secondary schools
- Hospitals
- Nuclear, hydroelectric, wind and solar power plant (except hybrids)
- Portable equipment
- Backup or emergency generators (permitted by air districts)

What Sources Are Reported

- Stationary combustion
- Process and fugitive emissions when specified
- Mobile emissions optional
- Indirect energy usage

What Gases Are Reported

- CO_2, CH_4, N_2O
- CO_2 from biomass fuels tracked separately
- HFCs, SF_6, PFCs where specified
  - Not currently specified in the oil and gas sector

Preparing for 2009 Reports

- Must report 2008 emissions in 2009
- 2009 reports should be complete
- Emissions calculations may be based on best available data and methods
  - Regulation methods preferred
- Verification is optional for 2009 emissions reports

Preparing for 2010 Reports

- 2010 emissions data report must meet full requirements of the regulation
- Monitoring equipment should be in place by January 1, 2009
- Everyone must verify their 2009 emissions data reports in 2010

Reporting Schedules

- Refineries and hydrogen plants report by June 1
- Power and cogen plants within these larger facilities report on the same schedule
- Most general combustion facilities report by April 1
- Oil and gas production facilities report by June 1

Fuel Analytical Data Capture

- Data collected to support calculations of GHG combustion emissions
  - Mass, volume, flow rate, heat content, carbon content
- Need 80% capture rate for source verification
- For <20% missing data:
  - Use 40 CFR Part 75/60 if applicable
  - Use mean of data captured if not

Fuel Use Measurement Accuracy

- Measurement procedures must assure fuel use is quantified within ±5% accuracy
- Maintain and calibrate devices to achieve ±5% accuracy
- Quarterly calibrations of operators' solid fuel scales
- Keep records for verification

Interim Data Collection Procedure

- ARB EO can approve interim procedure if fuel monitoring equipment breaks down
- When breakdown will result in >20% data loss for report year
- Limitations and procedure in section 95103

Using CEMS

- CEMS may be used to calculate combustion and process CO_2 emissions in most cases
- Operators may install new CEMS prior to January 2011
  - Meet 40 CFR Part 75 requirements
- Operators must choose between CEMS and fuel-based options for consistent reporting

Reporting *De minimis* Emissions

- Sources ≤3% of facility emissions, not to exceed 20,000 MT CO2e
- Still reported, but may be estimated using alternative methods

Data Completeness, Record Keeping

- Retain documents on GHG inventory design, development and maintenance for five years
- Implement internal audit and QA for reporting program
- Log changes in accounting methods, instrumentation
- Specifications in sections 95104-95105

Third Party Verification

- Optional for 2009 emissions reports
- Required beginning in 2010
- Verification opinion due 6 months after report submittal

Verification Key Steps

- Reporter contacts ARB-accredited verification body (VB)
- VB submits COI assessment to ARB
- Verification conducted following ARB OK
- Verification results discussed with reporter
- Reporter may revise report if time permits
- Verification body submits verification opinion to ARB and reporter

Verification Oversight

- ARB will provide training and accredit verifiers and verification bodies in 2009
- Verification process will assist compliance efforts and assure quality data
- Targeted review of submitted data and verifiers
- ARB responsible for enforcing regulation

QUESTIONS?

Reporting for Refineries

Stationary Combustion – CO_2

- Refinery Fuel Gas – CO_2 emissions from each RFG system

1. Carbon content every 8 hours
2. Carbon and HHV content daily, calculate EF, use daily average HHV
3. CEMS

Stationary Combustion – CO_2

- Natural Gas and Associated Gas – GHG emission calculation based on fuel HHV

1. HHV ≥975 and ≤1100 Btu/scf, use monthly HHV and ARB EF
2. Gas outside range, determine carbon content monthly
3. CEMS

Stationary Combustion – CO_2

- Other Fuels

1. Default HHV and EF
2. Measure HHV and use default EF
3. Measure carbon content
4. CEMS

Stationary Combustion – CO_2

- Low Btu Gases

1. Destroyed or used as supplementary fuel – treat as a fuel mixture – 95113(f)
2. Determine carbon content quarterly – 95113(d)(3)
3. Flexigas – carbon content daily - 95125(d)(3)(A)
4. Flared and reported to Air District – 95113(d)
5. CEMS

Stationary Combustion – CO_2

- Fuel Mixtures

1. Determine CO_2 emissions for each fuel separately and sum
2. RFG and NG or low Btu gas – determine carbon content of mixture every 8 hours
3. Associated gas and NG – determine emissions based of HHV
4. CEMS

Stationary Combustion – CH_4 and N_2O

1. Measure fuel HHV – use default EF
2. Default HHV and EF
3. Develop fuel specific EF with ARB approval (source testing…)

Source Test Process

- Prepare source test plan
  - See ARB guidance for template
  - Include test methods, schedule, sampling locations, QA/QC, etc.
- Submit plan to ARB for approval
- On approval, perform testing, providing ARB and air district notification of test dates for possible agency participation
- Using valid test data, develop appropriate emission factor(s)

Planning for Source Testing

- Schedule enough time for test plan preparation, approval, on-site testing, and data analysis
- GHG reporting deadlines cannot be delayed if source test data are not ready
  - Use other specified estimation methods in regulation if source test data not available
- ARB staff is providing written guidance and resources

QUESTIONS?

Process Emissions Catalyst Regeneration - CO_2

- Fluid Catalytic Cracking Unit
  - FCCU Based on EPA coke burn rate
- Other Catalyst Regeneration
  - Periodic regeneration
  - Continuous Regeneration (other than FCCU and Fluid cokers)

Process Emissions
Process Vents - CO_2, CH_4 and N_2O

- Report emissions not reported elsewhere
- Determine
  - Vent rate (scf/time)
  - GHG molar fraction in vent stream
  - Time duration of venting
  - Number of venting events

Process Emissions
Asphalt Production – CO_2 and CH_4

- Report emissions not reported elsewhere (e.g. Air District flaring reports)
- Determine
  - Mass of asphalt blown
- Use default CH_4 EF
- Use default destruction efficiency

Process Emissions
Sulfur Recovery – CO_2

- Report emissions not reported elsewhere (e.g. Air District flaring reports)
- Determine
  - Flow of acid gas to SRU
- Use default molar fraction CO_2 in acid gas, OR
- Or, conduct ARB approved source test to determine CO_2 molar fraction

Fugitive Emissions Wastewater Treatment – CO_4 and N_2O

- Determine annual wastewater volume
- Measure effluent COD quarterly
- Measure effluent N content quarterly
- For CH_4 emissions choose appropriate methane conversion factor

Fugitive Emissions Oil/Water Separators – CH_4

- Report emissions not reported elsewhere (e.g. Air District flaring reports)
- Determine
  - Volume of H_2O treated
- Use default EF based on system specifics – separator type and operating conditions

Fugitive Emissions Storage Tanks – CH_4

- Use EPA TANKS Model (Version 4.09D)
- Enter storage tank parameters for crude oil, naphtha, distillate oil, asphalt, and gas oil storage tanks
- Enter ARB supplied product constants (Antoine's constants)
- Calculate VOC emissions
- Convert to CH_4 using default CF or headspace gas analysis

Fugitive Emissions
Equipment Fugitives – CH_4

- Extend LDAR program to gas system components (RFG, natural gas, PSA off-gas)
- Identify, count and screen components
- Calculate VOC emissions using CAPCOA EFs and correlation equations
- Use gas composition or CF to convert VOC to CH_4

Flares and Control Devices CO_2, CH_4, and N_2O

- Calculate CO_2, CH_4, and N_2O emissions from combustion of pilot and purge gases
- Use Air District specific GHG emission method
- Use Air District flare destruction efficiencies
- If reporting not mandated by Air District use through-put based default EF and NMHC to carbon CF
- For "Other Destruction Devices" not included in Air District reporting
  - Measure volume of gas
  - Determine carbon and MW quarterly

QUESTIONS?

Reporting for Hydrogen Production Facilities

Stationary Combustion and Process CO_2

1. CEMS

2. Fuel Stationary Combustion and Process Emissions
   - Calculate and report fuel and feedstock separately

Stationary Combustion and Process CO_2 (cont'd.)

3. Fuel and Feedstock Mass Balance
   - Calculate stationary combustion CO_2 emissions for each fuel
   - Calculate each feedstock process CO_2 emissions
   - Correct feedstock emissions for carbon accounted for elsewhere
   - Sum stationary and feedstock

Hydrogen Production

- Monitor and report total hydrogen produced (scf)
- Report separately amount sold as transportation fuel

Transferred CO_2 and CO

- Calculate CO_2 and CO sold as transferred CO_2
- Transferred CO_2 and CO tracked separately, but not subtracted from total emissions reported

Also Reported
(Methods Like Refineries)

- Fugitives
- Flaring
- Process Vents
- Sulfur Recovery

Next Steps

- Examine ARB final regulation and Instructional Guidance
- Attend or monitor reporting tool workshop December 19
- Consult with ARB staff on questions
- Join e-mail list serves on reporting, verification, watch for additional training opportunities

ARB Contacts

- Richard Bode – Chief, Emissions Inventory Branch *rbode@arb.ca.gov (916) 323-8413*
- Doug Thompson – Manager, Climate Change Reporting Section *dthompson@arb.ca.gov (916) 322-7062*
- GHG Mandatory Reporting Website *http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm*

Staff Contacts

- General Reporting & GSCs, Patrick Gaffney
  pgaffney@arb.ca.gov (916) 322-7303
- Cogeneration, Renée Lawver
  rlawver@arb.ca.gov (916) 323-0296
- Cement, Patrick Gaffney
  pgaffney@arb.ca.gov (916) 322-7303
- Refineries & Hydrogen Plants, Byard Mosher
  bmosher@arb.ca.gov (916) 323-1185
- Electric Power Sector, Pamela Burmich
  pburmich@arb.ca.gov (916) 323-8475
- Verification Lead, Rajinder Sahota
  rsahota@arb.ca.gov (916) 323-8503